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| 10/088,747 | 03/22/2002 | Eric C. Edwards | 50412-01 US/PCT | 8800 |
| 25319 | 7590 | 12/13/2005 | EXAMINER | |
| FREEDMAN & ASSOCIATES 117 CENTREPOINTE DRIVE SUITE 350 NEPEAN, ONTARIO, K2G 5X3 CANADA | | | PIZIALI, JEFFREY J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2673 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/088,747 | | EDWARDS, ERIC C. | |
| | Examiner | | Art Unit | |
| | Jeff Piziali | | 2673 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 21 and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification (see Paragraphs 7 and 12, for instance) is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference characters) not mentioned in the description: 24, 25 and 26 (see Fig. 2). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference characters in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to because the "dashed line" mentioned in Figs. 3a, 4a, and 8 is indistinguishable from the background of the images as respectively illustrated in Figs. 3a-3e, 4a-4d, and 8-10. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: Paragraph 57 refers to "operator 5" (see Line 4) in Fig. 7. However, Fig. 7 uses reference numeral 105 to represent the operator (see also Paragraph 59, Line 8). Appropriate correction is required.

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5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 6 recites the subject matter of a motion compensation method including two head mounted displays and two cameras; and

Claim 20 recites the subject matter of a range sensor including a stereoscopic imaging system.

However, no such subject matter has been explicitly disclosed in the current specification (see, in particular, Paragraph 67).

Claim Objections

6. Claim 21 is objected to because of the following informalities: the sentence composition of "determining earlier captured image data that when transformed in dependence upon its associated camera position data and the HMD position data is for display within the portions; and, displaying with those portions of the field of view the transformed earlier captured image data" renders the meaning of the claim incomprehensible to one having ordinary skill in the art. Appropriate correction is required.

7. Claim 22 is objected to because of the following informalities: "emphasising" should be changed to "emphasizing" (see line 2). Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are the plural "head mounted displays" recited in line 1. Lines 3-4 speak only to a single head mounted display.

11. Claim 1 recites the limitation "the camera" in line 5, the acronym limitation "HMD" in line 7, the limitation "static objects" in line 8, and the plural limitation "the displayed locations" in line 11. There is insufficient antecedent basis for these limitations in the claim.

12. Claims 2-17, 21, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being dependent upon rejected base claims.

13. Claim 4 further recites the limitation "maintaining orientation" in line 2. There is insufficient antecedent basis for this limitation in the claim.

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14. Furthermore, the term "image necessary to fill the field of view" in claim 5 is a relative term which renders the claim indefinite. The term "necessary" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It would be unclear to one having ordinary skill in the art how large an image must be, and how much of the field of view must be filled, before such a so-called "necessity" has been met.

15. Claim 7 further recites the limitation "the camera position" in line 2. There is insufficient antecedent basis for this limitation in the claim.

16. Claim 8 is further rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are between the "independent position sensor" found in claim 8, line 2 and the "independent position sensor" found in claim 7, line 2. It would be unclear to one having ordinary skill in the art whether the invention comprises a single "independent position sensor," or whether the invention comprises two separate and distinct "independent position sensors."

17. Claim 17 further recites the limitation "to reduce perspective distortion" in line 2. There is insufficient antecedent basis for this limitation in the claim. In particular, it would be unclear

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to one having ordinary skill in the art what base level the perspective distortion is being reduced from.

18. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are the plural "head mounted displays" recited in line 1. Lines 4-5 speak only to a single head mounted display.

19. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are between the plural "displayed locations" in line 2 and the singular "displayed location" in line 10; and between "a sensor" in line 6 and the singular "a sensor" in line 8. It would be unclear to one having ordinary skill in the art whether the invention comprises a single "displayed location," or whether the invention comprises multiple separate and distinct "displayed locations." Additionally, it would be unclear to one having ordinary skill in the art whether the invention comprises a single "sensor," or whether the invention comprises two separate and distinct "sensors."

20. Claim 1 recites the limitation "the camera" in line 6, the acronym limitation "HMD" in line 8, and the limitation "static objects" in lines 10-11. There is insufficient antecedent basis for these limitations in the claim.

21. Claim 22 further recites the limitation "de-emphasising" in line 2. There is insufficient antecedent basis for this limitation in the claim. In particular, it would be unclear to one having ordinary skill in the art what base level the image data is being deemphasized from.

Claim Rejections - 35 USC § 102

22. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

23. Claims 1-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Hirose et al ("Transmission of Realistic Sensation: Development of Virtual Dome," Proc. IEEE VRAIS 93, IEEE Neural Networks Council, Piscataway, N.J., 01-1993, pp. 125-131).

Regarding claim 1, Hirose discloses a method of motion compensation for head mounted displays comprising the steps of: providing a captured image [Fig. 1; Image Data] from an image capture device [Fig. 1; Camera Head] to a head mounted display [Fig. 1; HMD] (see Section 1) including a display [Fig. 3; Eyephone] having a field of view [i.e. scope of view]; providing camera position data [Fig. 3; via Camera Head Controller] relating to a position of the camera and associated with the captured image [Fig. 3; via Frame Grabber]; providing HMD position data [i.e. head orientation] relating to a position of the head mounted display; transforming [Fig. 3; via Virtual Dome Generator] the image to vary a displayed location of static objects [see Figs. 5, 6, 9, 11] within the image relative to the field of view in accordance with the camera position

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data and the HMD position data; and, displaying portions of the image at the displayed locations, those portions remaining within the field of view (see Sections 2.1-2.3).

Regarding claim 2, Hirose discloses the HMD position data is data relating to the present position of the head mounted display and wherein the camera position data is data relating to the position of the camera when the associated image is captured and wherein the step of transforming the image includes the steps of: determining an offset between the HMD position and the camera position; and, offsetting the image such that it is offset an amount proportional to the offset between the HMD position and the camera position (see Section 2.3 -- wherein when the user changes his head orientation, he will initially see previously obtained/offset images for a few instances).

Regarding claim 3, Hirose discloses portions of the field of view for which image data is unavailable are filled with a predetermined fill (see Section 2.3 -- wherein when the user changes his head orientation, he will initially see previously obtained/filled images for a few instances).

Regarding claim 4, Hirose discloses the predetermined fill has features for maintaining orientation of a wearer of the head mounted display (see Section 2.3 -- in particular, the last sentence).

Regarding claim 5, Hirose discloses the captured image is larger than the image necessary to fill the field of view of the head mounted display, and wherein only a portion of the

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captured image is displayed (see Sections 2.2 and 2.3 -- wherein images located in user's scope of view comprise only a portion of the overall virtual dome).

Regarding claim 6, Hirose discloses the system comprises two head mounted displays [Fig. 3; CRT, HMD, Eyephone -- wherein there are separate displays for each of the user's eyes] and two cameras [Fig. 3; dual CCDs] (see Section 2.2).

Regarding claim 7, Hirose discloses the system comprises: an independent position sensor [Fig. 3; Camera Head Controller] for sensing the camera position and for providing the camera position data (see Section 2.2).

Regarding claim 8, Hirose discloses the system comprises: an independent position sensor [Fig. 2; Head Position Sensor] for sensing the head mounted display position and for providing the HMD position data (see Section 2.1).

Regarding claim 9, this claim is rejected by the reasoning applied in rejecting claim 8.

Regarding claim 10, Hirose discloses the system comprises: a mechanism [Fig. 1; Camera Head] for moving the camera; and means [Fig. 1; Communication Link] for transmitting the HMD position data to a system in communication with the mechanism for moving the camera, wherein the mechanism for moving the camera moves the camera in response to a change in HMD position data (see Section 1).

Regarding claim 11, Hirose discloses the HMD position data comprises orientation data (see Section 2.3 -- user's scope of view).

Regarding claim 12, Hirose discloses the camera position data comprises orientation data (see Section 2.2 -- camera's viewing angle).

Regarding claim 13, Hirose discloses the camera position data comprises displacement data (see Section 2.2 -- camera's rotation rate).

Regarding claim 14, Hirose discloses the HMD position data comprises displacement data (see Section 1 -- head movement).

Regarding claim 15, this claim is rejected by the reasoning applied in rejecting claim 13.

Regarding claim 16, this claim is rejected by the reasoning applied in rejecting claim 14.

Regarding claim 17, Hirose discloses the step of transforming the image to reduce perspective distortion, wherein the camera includes a range sensor [Fig. 6; Range Scan] (see Section 3.1).

Regarding claim 18, this claim is rejected by the reasoning applied in rejecting claim 1.

Regarding claim 19, this claim is rejected by the reasoning applied in rejecting claim 17.

Regarding claim 20, Hirose discloses the range sensor includes a stereoscopic imaging system [Fig. 6; Stereo Pair] (see Section 3.1).

Regarding claim 21, Hirose discloses when portions of the field of view for which image data is unavailable are detected, determining earlier captured image data that when transformed in dependence upon its associated camera position data and the HMD position data is for display within the portions; and, displaying with those portions of the field of view the transformed earlier captured image data (see Section 2.3 -- wherein when the user changes his head orientation, he will initially see previously obtained images for a few instances).

Regarding claim 22, Hirose discloses the step of displaying transformed earlier captured image data includes a step of de-emphasizing the transformed earlier captured image data (see Section 2.3 -- wherein if the user continues looking in the same direction for a noticeable period of time, images from the remote camera will refresh the old ones and portray live video images of the remote location).

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stuttler (US 6,580,448 B1), Rogina et al (US 6,327,381 B1), Daily et al (US

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6,317,127 B1), Maquire (US 6,307,589 B1), Carmein (US 6,152,854 A), Galiana et al (US 5,984,475 A), Carmein (US 5,980,256 A), Ishibashi et al (US 5,978,015 A), Fernie et al (US 5,933,125 A), Welch et al (US 5,684,498 A), Everett et al (US 5,307,271 A), Baldwin (US 4,568,159 A), and Lewis (US 4,028,725 A) are cited to further evidence the state of the art pertaining to motion compensation apparatuses for head mounted displays.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571) 272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



J.P.

13 September 2005



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